SLAC Accident Summary

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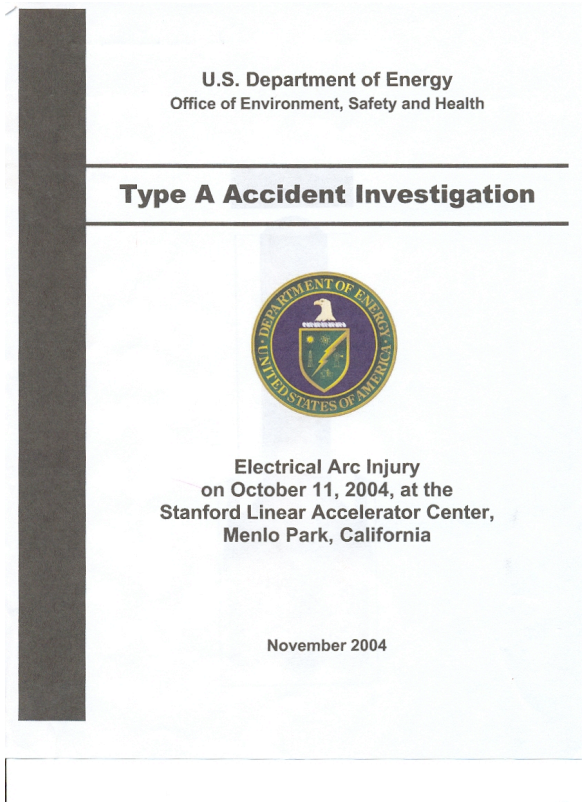
The Accident


U.S. Department of Energy
Office of Environment, Safety and Health

Type A Accident Investigation

Electrical Arc Injury
on October 11, 2004, at the
Stanford Linear Accelerator Center,
Menlo Park, California

November 2004

On October 11, 2004, at approximately 11:15 am, a subcontractor electrician working at the Stanford Linear Accelerator Center (SLAC) received serious burn injuries requiring hospitalization due to an electrical arc flash that occurred during the installation of a circuit breaker in an energized 480- Volt (V) electrical panel.

Probable Cause

The electrician experienced trouble while installing the last of three screws required to make electrical connections between the circuit breaker and the 480 volt panel board.

It is believed the fault occurred as he applied more pressure on the screw head to force alignment of the screw and the threaded hole in the bus bar link.

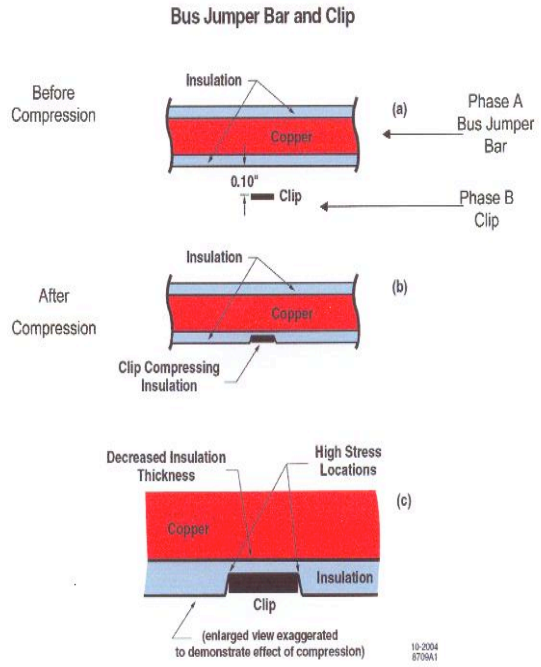


Figure 3-2. The effect of contact between the bus jumper bar and the clip (not to scale)

The Accident Scene

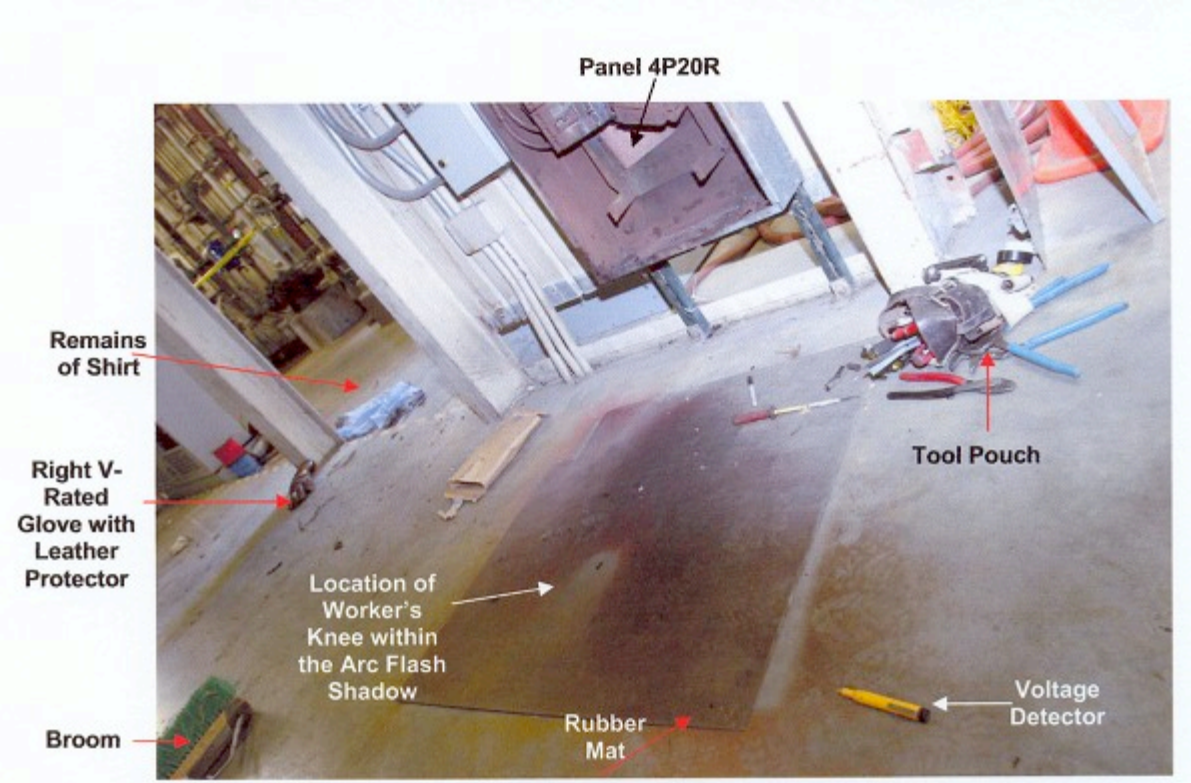


Figure 2-3. The insulating mat with the outline of BSE-1's knee in the arc flash shadow

Key Deficiencies

- The Accident Investigation Board identified these key deficiencies:
  - There was no approved electrical hot work permit
  - The workers were not wearing the appropriate Flame Resistant (FR) clothing and all the required Personal Protective Equipment (PPE)
  - The Bay Span Laborer (BSL) was not trained to be backup for an electrician
  - No one in the SLAC management chain had been informed of the decision by the SLAC Field Supervisor (FS-I) to install the circuit breaker in an energized panel

There was no reason to install the circuit breaker with the panel energized!!!!!!

PPE and Clothing

Required PPE

List of PPE and Protective Clothing that BSE-1 Should Have Been Wearing

NFPA 70E Task Hazard Risk Category: 2*

Protective Clothing and Personal Protective Equipment Required:

- V-rated gloves with leather protectors
- V-rated tools
- Nonmelting or untreated natural fiber T-shirt and underwear
- FR pants (8 calorie/cm2) – Or, FR coverall over cotton long-sleeved shirt and pants
- FR shirt (8 calorie/cm2) – Or, FR coverall over cotton long-sleeved shirt and pans
- Safety glasses
- Double-layer switching hood (with FR face shield)
- Hearing protection
- Leather work shoes

See the photographs in Figures 3-4 and 3-5.

Figure 3-3. List of protective clothing and PPE that BSE-1 should have been wearing

Remains of Actual PPE

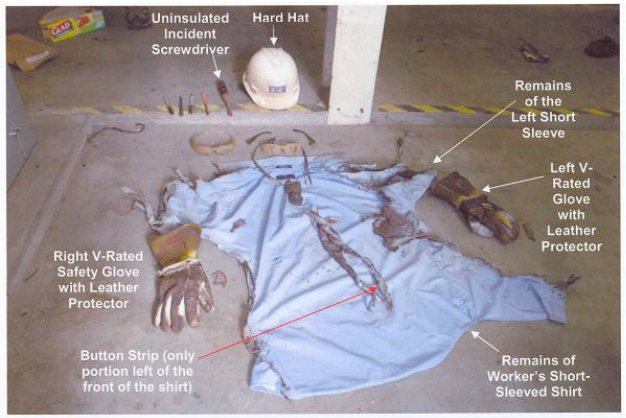


Figure 2-6. BSE-1's burned shirt and his flash-damaged PPE and tools

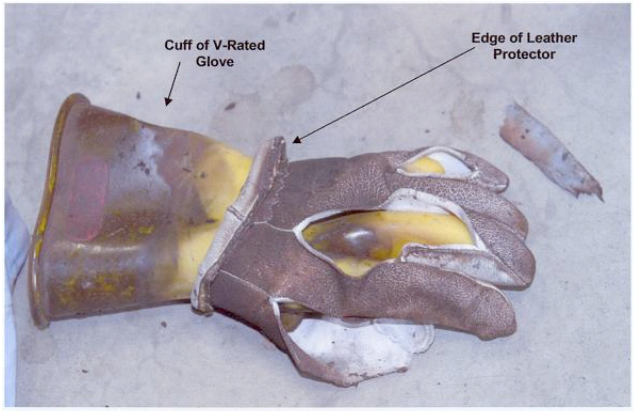


Figure 2-8. Closeup of one of BSE-1's burned gloves

Description of Injuries

- Contractor received third degree burns on the face, chest, and legs and second degree burns on the arms, involving approximately 50% of his body.

Arc Flash

When an arc flash occurs the temperatures can reach 35,000° Fahrenheit (F). Exposure to these extreme temperatures bums the skin and causes ignition of clothing, which adds to the burn injury.

—Arc flashes can and do kill at distances of 10 feet.

Note: Test dummy used for demonstration

Conclusion

- Our safety record is only as good as our last five minutes.

Stay Vigilant !!!